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- A New Species of *Berlesiella*, Jour. Mycol. 9:217, Dec. 1903.
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A New *Melogramma*, Jour. Mycol. 10:49, March 1904.
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Pyrenomyces scarcely known in North America, Jour. Mycol. 10:226-8, Sept. 1904.
Sphaeria Calva Tode, Jour. Mycol. 11:1, Jan. 1905.
The Genus *Gibellula* Cava, Jour. Mycol. 11:49-50, March 1905.
A New *Chaetosphaeria*, Jour. Mycol. 11:105, May 1905.
A New Species of *Kalmusia*, Jour. Mycol. 11:153, July 1905.
Peziza Pubida B. & C., Jour. Mycol. 11:154, July 1905.
North American Species of *Marasmius*, Jour. Mycol. 11:201-12, 233-47, 12:1-9, Sept. 1905-Jan. 1906.
North American Species of *Heliomyces*, Jour. Mycol. 12:92-5, May 1906.
North American Species of *Lepiota*, Jour. Mycol. 12:154-9, 195-203, 242-48, 13:1-18, July 1906-Jan. 1907.
North American Species of *Agaricaceae*, Jour. Mycol. 13:53-62, 143-153.
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TWO NEW HYPOGAEOUS SECOTIACEAE.

BY WILLIAM ALBERT SETCHELL.

In the immediate vicinity of Berkeley, and in fact upon the campus of the University of California itself, as well as elsewhere, Dr. N. L. Gardner and myself have not infrequently found specimens of two members of the *Secotium*-family which appear to be new and which are strange in their habitat. They grow in exactly the same fashion that many of the so-called hypogaei do,—i. e., not really buried in the ground, but partially buried under earth and absolutely covered over with a compact layer (or layers) of fallen leaves and other debris. It is in just such places and covered in exactly the same way, that we have found many of the true hypogaei, such as specimens of *Hymenogaster*, *Hydnangium*, *Tuber*, etc., in this same region. The method of searching for these *Secotiaceae* is just the same as that employed for the *Hymenogastraceae*, *Tuberaceae*, etc., viz., of raking off the covering of dead leaves and exposing the ground underneath, when they may be seen either superficial on the earth, or else very slightly buried in it. It seems proper to call attention to this matter of habitat, since, so far as the literature is known to me, there is almost no mention of such habitat favored by other members of the same group (cf. however, Bucholtz, *Hedwigia*, vol. 40, p. 314, 1901) and also because of the supposed absence of hypogaeous species in this family, the statement has been made that the members of this group are all epigaeous. (cf. Fischer, in Engler and Prantl, *die nat. Pflanzenfam.* I. 1 * * p. 299, 1898).

Another striking thing about the plants with which this article is concerned is, that they both appear at first sight to be

young individuals of some Hymenomycetous species. On first being uncovered one looks very much like some species of *Coprinus* or similar genus, while the other has a very striking resemblance to a young *Russula* with a red pileus. Both have well developed stipes, what appear at first sight to be gills, and one has a transverse veil, although the last is slight. On careful examination, however, it is seen that they are members of the Secotiaceae and, although new, are related to species long described.

Both of these plants belong to the genus *Secotium* as extended by Fischer in his account of this family in the Engler and Prantl. A careful study of all the forms included under *Secotium* in this extended sense, however, will probably result in a splitting into several different genera, each reasonably distinct from the other. I am not sufficiently acquainted with the species described otherwise than from description and shall consequently not undertake any segregation which has not already been proposed. I realize the difficulties in proposing any satisfactory ultimate segregation except as the result of extensive and comprehensive study of types and of fresh or well prepared alcoholic materials representing various conditions and stages of development. In general appearance, all the species are agaricoid rather than like the members of the Hymenogastraceae, while in structure of the mature gleba, they in common with the other Secotiaceae, range from those closely resembling the Hymenogastraceae to those which have gill-like structures which anastomose only slightly. In color of spores, the members of this genus in its extended sense range from colorless through yellow and brown to black, while in shape of spores, they vary from globular through ovoid to fusiform. These extreme variations make the proper reference as to genus very uncertain in the case of new species.

The type of the genus *Secotium* is *S. Guenzii* Kunze from the neighborhood of the Cape of Good Hope. It was briefly described by Kunze in 1840 (*Flora*, p. 322) and it has been well illustrated from the original specimens, by Corda (*Icones Fungorum*, vol. 5, pl. 6, f. 10-18, 1842), so that we may judge fairly of all necessary details of its structure. With its distinct volva, the coarse veins of the gleba, its lack of anything resembling lamellae, its fairly regular chambers, and obovoid, colorless spores, it differs very decidedly from either of the two plants which are the subject of this article, as well as from all other species which have thus far been referred to the same genus with it. In the same work, Corda also figures Berkeley's *S. melanosporum* (loc. cit., pl. 6, f. 19-24) which most nearly of all yet described species resembles *S. Guenzii*, but it has no persistent and conspicuous volva, what appears to be a sort of arachnoid transverse veil, and very dark, brownish-black, ovoid spores. It has, however, similar veins running out through the gleba.

Finally Corda illustrates and describes a second species of Berkeley's, viz. — *S. coarctatum*, from Swan River in Southwestern Australia, the same locality whence the original specimens of the preceding species also came. *S. coarctatum* seems to be close to the plant described below under the name of *S. tenuipes* and its characters will be discussed in that connection. It is certainly some considerably different from both the species mentioned above. There is one other type which especially concerns us in the present consideration and that is the *S. Mattirolanus* which is the type of the genus *Elasmomyces* of Cava (cf. Malpighia, 1898). This genus is subsumed under *Secotium* by Fischer (loc. cit.) but with the statement that it is doubtless to be considered independent, only the difficulty at present is to determine just which of the described species of *Secotium* are to be associated with it as well as perhaps the exact lines of demarcation between the two genera. The species, to be described below under the name of *Elasmomyces russuloides*, is very close to Cava's plant and a farther discussion will be found in connection with the description of it. Of the other species referred to this genus few are known to me from actual specimens. The widely distributed *S. acuminatum* (or *S. agaricoides* Hollos) has not occurred to me nor does it occur in Californian collections, unless indeed, as hardly seems probable from the descriptions, it is identical with *S. nubigenum*, Harkness, as Hollos supposes (cf. Hollos, Die Gastromyceten Ungarns, p. 37, 1904, under *S. agaricoides*, also Lloyd, Mycological Notes, p. 139). Hollos has also referred under the same species the *S. erythrocephalum* Tulasne, a species collected by myself in New Zealand, which seems certainly amply distinct from the Hungarian plant, at least. A careful search for the type specimen of *S. nubigenum*, Harkness, in his collection in the Herbarium of the California Academy of San Francisco, even before the bulk of that collection was destroyed by the fire following the earthquake of April 18, 1906, failed to disclose it and there seems to be no doubt that Harkness failed to retain, or at least, to carefully preserve it. The *Secotium Texense* B. & C., as well as the *S. decipiens* Peck, seem properly to be referred to the genus *Gyrophragmium* as has been done (cf. Lloyd, loc. cit. pp. 154 and 197).

In all there seems to be only six species of those credited to this genus which have been referred to as having been found in the United States, viz.:

- S. texense* B. & C., now referred to *Gyrophragmium*.
- S. decipiens* Peck, now referred to *Gyrophragmium*.
- S. nubigenum* Harkness, which has been referred, but probably erroneously to *S. acuminatum* Mont.
- S. Warnei* Peck, which seems by unanimous consent to be referred to *S. acuminatum* Mont.

S. coarctatum B. & C., to which species a specimen from Texas has been referred by Lloyd (cf. under *S. tenuipes* below) and *S. macrosporum* Lloyd, from Texas (Lloyd, Myc. Notes, p. 139, pl. 13, f. 12-16, 1898).

It will be seen from this list that there are only four species, in all probability, of *Secotium* in our flora and neither of two described below are likely to belong to any one of these. They have been compared as carefully as possible with all the descriptions and figures so far as known to me and seem reasonably, if not amply, distinct.

***Secotium tenuipes* sp. nov.** — Gregarium; peridio subgloboso aut late ovoideo, subumbonato, basi plus minusve truncato et velo horizontali exiguo evanescente arachnoideoque instructo, 1-2 cm. lato et 1-1.5 cm. alto, luteo-fusco ad fusco, glabro, carnoso; gleba a stipite fere libera sed ad apicem extremam lamelliformiter decurrente, lacunis sinuosis aut regulariter aut indefinite, labyrinthico marginibus lamelliformibus, luteo-fusca, sine venis propriis; stipite longo aut brevi (ad 2 cm.), gracile, evolvato, striato, per glebam libere percurrente sed ad apicem in glebam expanso; basidiis 2-4-sporiferis, sterigmatibus distinctis subintumescentibusque; sporis ellipticis aut ovoideis, 12-16 μ longis, 8-12 μ latis, luteofuscis, levibus. In terram argillaceam sub foliis Eucalyptus et Quercus prope Berkeley et San Francisco, Californiam. Plate 107, f. 4-8.

This species is not uncommon under the leaves of Eucalyptus Globulus and of some other trees, particularly oaks, in the vicinity of the Eucalyptus, both in the neighborhood of Berkeley and of San Francisco. When first uncovered it looks very much like a *Bolbitis*, or a *Coprinus*, especially when the lamelliform gleba is exposed more than usual at the base. This aspect is very well shown in the figure on plate 107. It is usually four to five centimeters in height, with a longer or shorter stipe, an evanescent and somewhat arachnoid veil, and the whole plant is a yellow-brown to a dark-brown color. They generally appear more or less bent, flattened under the weight of the layer of leaves which entirely conceals them from view until exposed by the use of the rake. They occur scattered over a considerable area, as a rule, in twos or threes together and seem to prefer slight slopes which are well drained and yet retain moisture longer than the neighboring levels. There is little trace of any structure which might be supposed to represent a volva, but the transverse veil while scanty and arachnoid, is still distinct in the early stages of adult development. In structure of the gleba, the specimens seem to vary considerably. In some, the chambers are very regular in shape and position and this is particularly to be seen in a transverse section of what we may call the pileus. Even on the margins which abut on the stipe and the lower ex-

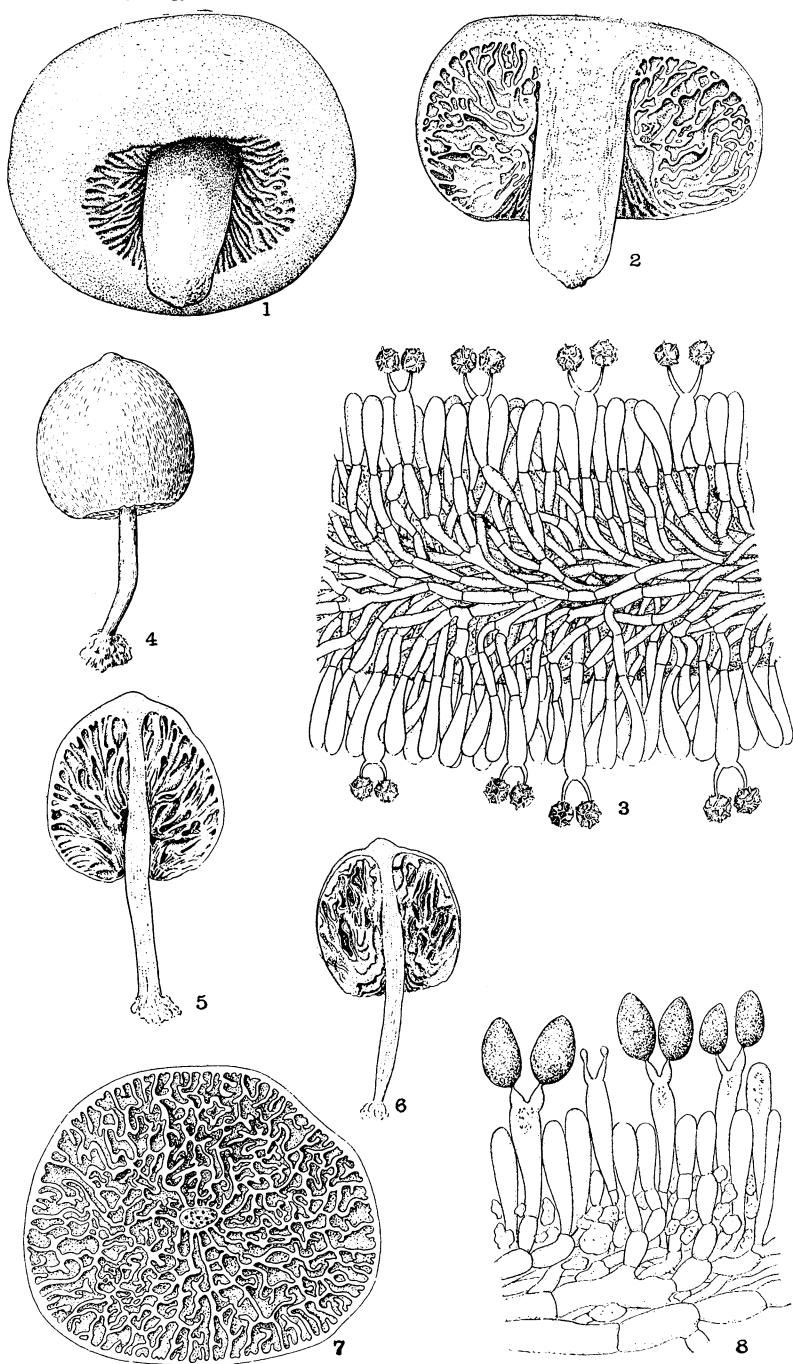
posed portions, the gill-like structure is not very pronounced, but in other specimens the gill-like structure of the gleba is very plainly to be seen. It is always more or less apparent in longitudinal sections as may be seen on comparing figures 5 and 6 on Plate 107. In some cases the anastomosing plates seem much like those of a *Favolus*, although it is difficult to make certain of any regularity such as occurs usually in species of that genus. The polyporoid and agaricoid resemblances are, however, more striking than hymenogastroid. The chambering, nevertheless, is sufficiently complete to range this species in the Hymenogastrineae rather than in any other group of equal rank.

In appearance and structure, this species varies so much from *S. Guenzii*, the type of the genus that it may well be doubted whether it will ultimately be considered cogenetic with it, but, at present, it seems best to refer to *Secotium* rather than attempt to split up that genus. Its nearest relatives are *S. coarctatum* Berkeley and *S. Gunnii* Berkeley. It resembles very closely the figures of Berkeley (Hooker's Journal of Botany, 1845) and of Corda (Icones Fungorum, pt. I, pl. 6, f. 25-30), but differs from them in the shape of the pileus (or peridium) and in the shape and size of the spores. From *S. Gunnii* Berkeley as described by Massee (Grevillea, vol. 19, p. 96, 1891), it differs in the slender sterigmata and in the shape and size of the spores. Lloyd (The Lycoperdaceae of Australia, New Zealand and Neighboring Islands, p. 7, pl. 26, f. 7 and 8) figures a plant from Texas, under the name of *S. coarctatum*, which may belong to this species. It agrees reasonably well in habit, but the spores appear to be more globular than in our plants. I am indebted to Dr. Ed. Fischer of Bern, for examining material and giving me the benefit of his opinion concerning the position of this plant.

***Elasmomyces russuloides* sp. nov.** Solitarius aut subgregarius; peridio depresso-globoso, inferne umbilicato et pseudolamellas ostendente, 1-1.5 cm. diam., 1-1.25 cm. alto, albo plus minusve rubescente, glabro; gleba alba, estipite fere ad apicem libera, intus regulariter cellulosa cellulis polygonato-sinuosis, extus plane lamellosis; stipite brevi ad brevissimo, moderate robusto, tereti, nunc recto nunc curvato, per glebam ad apicem percurrente et distincto; basidiis 2-4 sporiferis, sterigmatibus gracilibus curvatisque, cystidiis nunc frequentis nunc sparsis, plus minusve clavatis gracilibusque; sporis globosis, albidis, lineis elevatis in rete irregulariter contextis, 6-8 μ diam. Plate 107, f. 1-3.

Infrequens sub foliis *Hetermeles arbutifoliae* et *Quercus agrifoliae*, in Berkeley, California. Coll. N. L. Gardner et W. A. Setchell.

This species, unlike the preceding, is not at all plentiful in the region about Berkeley, where it has been found thus far, only, and occurs in small numbers usually more or less buried in the soil and covered by a thick layer of leaves. When the leaves are



SECOTIUM TENUIPES SETCHELL n. sp., AND ELASMOHYCES RUSULOIDES SETCHELL n. sp.

raked off it is seen partially (up to about half) buried and looking very much like a young *Russula* of one or other of the common red-topped species. The illusion is not dispelled when it is removed from its place and examined, for the pseudo-lamellae showing at the base of the peridium give still a very decided agaricoid appearance. When the gleba is cut across, however, all doubt is removed, since, except for the percurrent stipe, the structure is thoroughly hymenogastroid. The lacunae are regular and open and there is no such inner indefinite and confusing lamelliform structure as has been mentioned as occurring in the preceding species. A comparison of figures 2, 5, and 6 will show what is meant better than words may describe. The basidia are most commonly 2-spored in the specimens I have examined and the spores while simply appearing rough under a moderate power still show something of the irregular reticulation of raised lines which appear distinctly when subjected to examination with an oil immersion objective. In some specimens cystidia appear very numerous while in others few are to be seen. The affinities of this species are very closely with *E. Mattirolanus* Cav., from which it is to be distinguished by the color of the peridium, the more rounded and thicker margins, and the smaller sculptured spores. Dr. Ed. Fischer has kindly compared our specimens with an original plant from Cavara and points out these distinctions. From *Secotium* (*Elasmomyces*) *Krjukowense* Bucholtz and *S.* (*Elasmomyces*) *Michailowskianum* Bucholtz, so far as I may judge from the descriptions, this species differs in color as well as size and markings of the spores. These three species seem to be the only *Secotiums* thus far described with which it is necessary to compare our plan.

University of California, Berkeley.

October 21, 1907.

EXPLANATION OF PLATE 107.

Elasmomyces russuloides sp. nov.

1. General habit of a typical plant seen obliquely from below. $\times 2$ diam.
2. Half of a similar plant, divided longitudinally in the median plane. $\times 2$ diam.
3. Portion of a section across a trama-plate, showing the basidia and spores. $\times 1000$ diam.

Secotium tenuipes sp. nov.

4. General habit of a typical plant, seen from the side. 1 diam.
5. Half of a similar plant, divided longitudinally in the median plane. $\times 1$ diam.
6. Similar view of another typical plant. $\times 1$ diam.
7. Surface view of medium transverse cut of the pileus, showing peridium, gleba, and stipe. $\times 2$ diam.
8. Small portion of the hymenium, showing basidia, spores, and cystidia. $\times 1000$ diam.

Drawings prepared by H. N. Bagley under direction of the writer.